SGS ATES
MICROCOMPUTER SYSTEM

THE PROGRAMME DEDICATED TO EUROPE

The SGS-ATES CLZ80 Microcomputer System is the result of two years research and product development by our own team of professional hardware and software engineers. This Microcomputer System is a highly rationalized component set optimized for the OEM user.

It is an open frame system of maximum flexibility and very low cost.

SGS-ATES is the only MOS manufacturer in Europe chosen to manufacture the advanced Z80™ chip set from ZILOG. We have used this chip set to design a microcomputer for the European user. SGS-ATES knows better than anyone the needs of the European user and can provide experienced applications support.

INTRODUCTION

The SGS-ATES Microcomputer System is based on our Z80 microprocessor chip set and MOS memory products. It is supported by complete program development software and experienced applications engineers located throughout Europe. The Z80 chip set is the most advanced 8-bit MOS microprocessor in the world, using the latest semiconductor technology. Its architecture, compatible with but superior to the older 8080 range, gives new unprecedented power to the world of 8-bit microcomputers. The Z80 CPU has many innovative features which increase by several times the program execution speed and efficiency:

- Dual register sets are provided for high speed interrupt processing and other structures of foreground/background programming.
- These dual register sets each include an 8-bit accumulator, program status flags and six 8-bit storage registers.
- The six 8-bit storage registers can be used as three 16-bit register pairs.
- In addition there are two index registers for memory addressing, and a 16-bit pointer to an external stack for virtually unlimited subroutine nesting or temporary data storage.
- Vectored interrupt service routines and automatic refresh of dynamic RAM memories is provided.
- Non-maskable interrupt directly to the Z80 CPU for hardware breakpoint or system reset.

The instruction set of the Z80 CPU, used in the SGS-ATES Microcomputer System, is the most comprehensive in the world, featuring 4-bit, 8-bit and 16-bit operations with BCD arithmetic and multiple shift modes. The Z80 CPU is the only CPU which supports both bit and string data. Single instructions can access one bit or up to 64K bytes of data. The instruction set contains 158 instructions, twice as many as any other 8-bit processor available today.

Z80 PROCESSOR

The most important and unique features of the Z80 processor are:

☐ memory block moves, up to 64K bytes can be moved at a rate of 8.4 μsec./byte.

☐ memory block search, up to 64K bytes can be searched on command from a single instruction.

☐ block I/O transfer, rates of up to 125K bytes/second can be executed under program control.

☐ bit handling, a single instruction can set, test or clear any single bit in any register or in up to 64K memory locations.

☐ relative jumps and absolute jumps, a two byte instruction controls relative jumps to reduce program length. Absolute jumps require only 3 bytes for any memory location.

☐ BCD arithmetic and a full complement of shift instructions.

☐ 8-and 16-bit arithmetic operations provide very fast data calculations.

☐ high level languages are easily and efficiently interpreted by the 158 instruction set.

MICROCOMPUTER SYSTEM

These central processor features make the SGS-ATES CLZ80 Microcomputer System the only choice for the serious OEM user. The CLZ80 is the best, low cost general purpose computer for all applications.

☐ Text processing and communications.

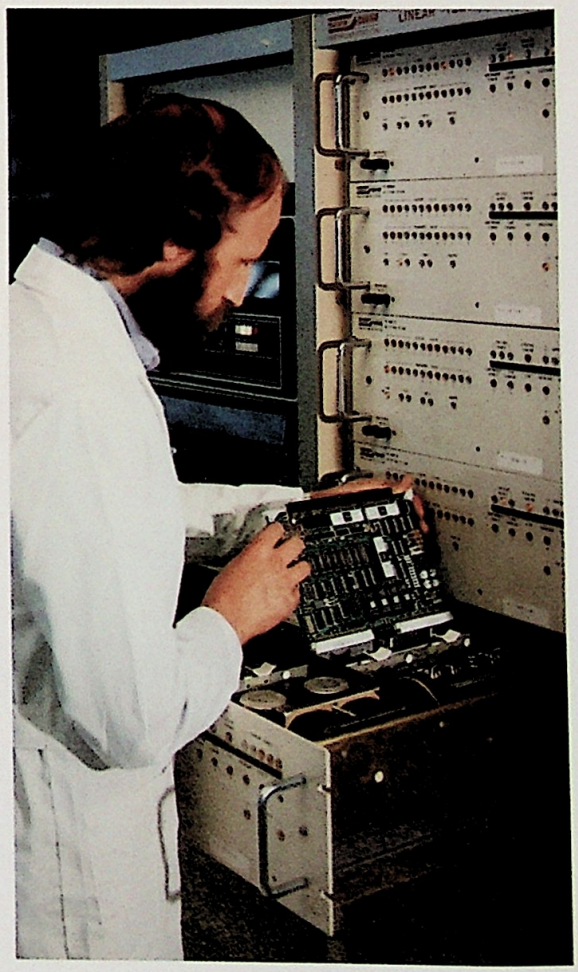
☐ Word processing and type setting.

☐ Machine control and data acquisition.

☐ Robotics and automation.

☐ Business computing.

☐ Entertainment and hobby computing.



SGS-ATES CLZ80 MICROCOMPUTER SYSTEM

The SGS-ATES Microcomputer System is built round an open card cage that can hold up to 8 high quality printed circuit boards. The system power supply can be fixed to the side of the card frame making an overall size of only 37.3 x 22.5 x 11 cm.

γamma-BUS
SGS-ATES has developed a new standard bus structure, the γamma-BUS for this microcomputer system. Each board of the system is a double Eurocard size and carries two 64-pin connectors. These ensure enough pins are available to carry multiple ground connections to a shielded bus structure on the mother board. This eliminates bus signal interaction which can be troublesome in unshielded high speed systems. Each active signal/ground couple acts as a transmission line and can be terminated. Signal reflections can therefore be completely eliminated.

POWER SUPPLY
All the boards of the SGS-ATES Microcomputer System set require only a single + 5 V supply; each board that requires other voltages carries a high efficiency DC-DC converter.

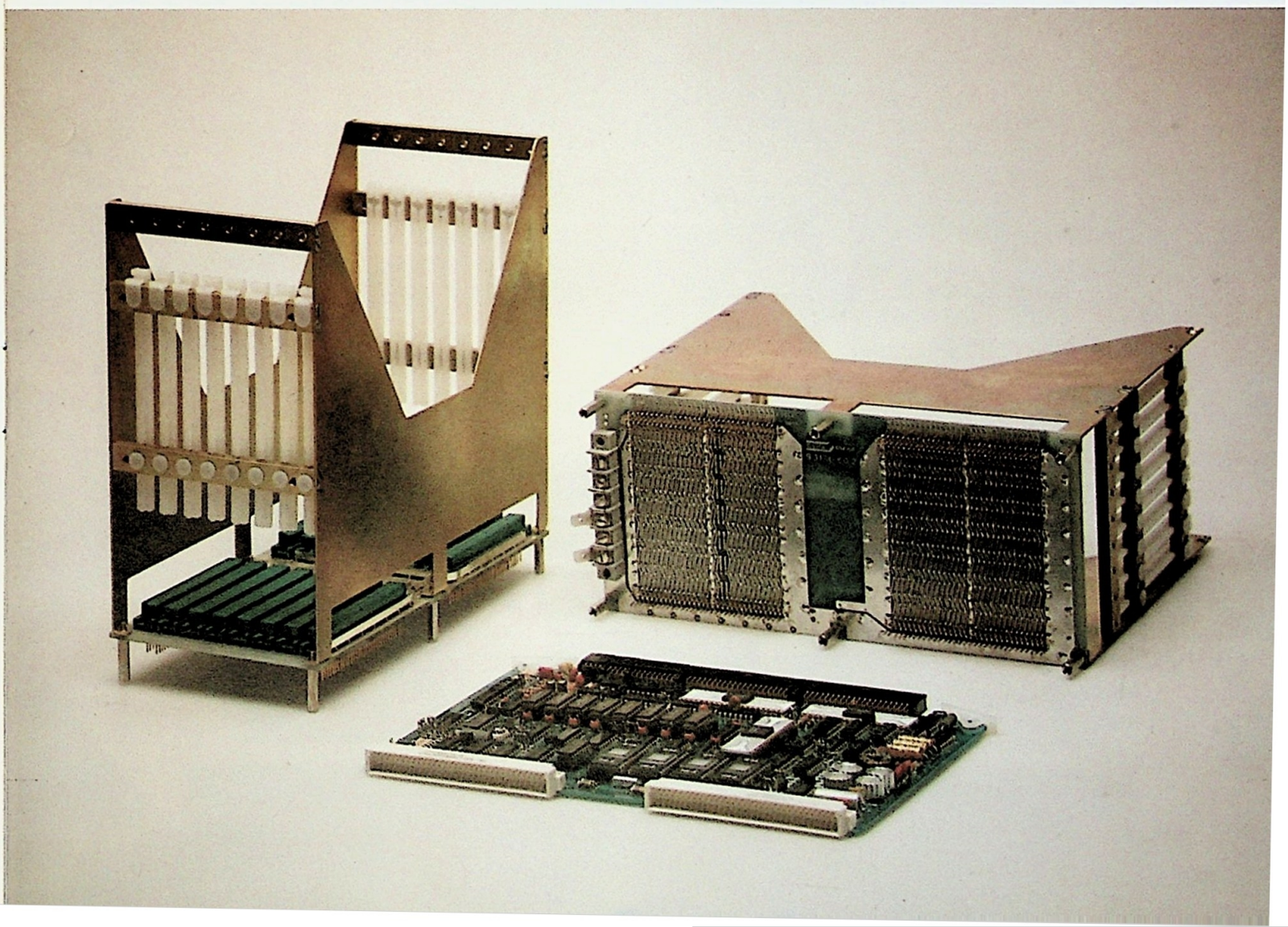
CIRCUIT BOARDS
The printed circuit boards of the SGS-ATES microcomputer series are standard double Eurocard size. The boards are the highest quality fiberglass with double side wiring and plated through holes. Circuit track widths are chosen carefully to correspond to the signals carried. The wiring is protected by a layer of varnish and the board is over printed with annotation for connections, components and links. Sockets are used for the dynamic RAMs to facilitate the change from 4K to 16K, and for the PROM/ROM carrying the software programs.

γamma-BUS

TERMINATED

SHIELDED

FULLY BUFFERED



CIRCUIT BOARDS

CLZ80
The central processor board CLZ80 is a very high density single board microcomputer capable of stand alone operation. This microcomputer board contains from 4K up to 16K RAM and up to 8K PROM or ROM for user or development software. Four I/O ports with «handshake» protocol lines are implemented in addition to 20 mA current loop, RS 232, or TTL level serial communications up to 9600 baud.
A dual interface with control signals for audio cassette recorders for bulk data or program storage is also provided.
Optional configurations of the CLZ80 can be implemented by the user on the board by means of wired links. The memory address map and power-on (reset) jump address are user selectable.

RAZ80
The memory boards for RAM of 16K, 32K, 48K or 64K also include 4 sockets for 8K ROM or PROM. The memory board provides automatic memory refresh if this is not provided by the CPU and thus can be used with alternative processors to the Z80, provided that the designer respects the signals of the γamma-BUS standard. The memory starting address and page size (in 4K segments) are user selectable. Single + 5 V supply.

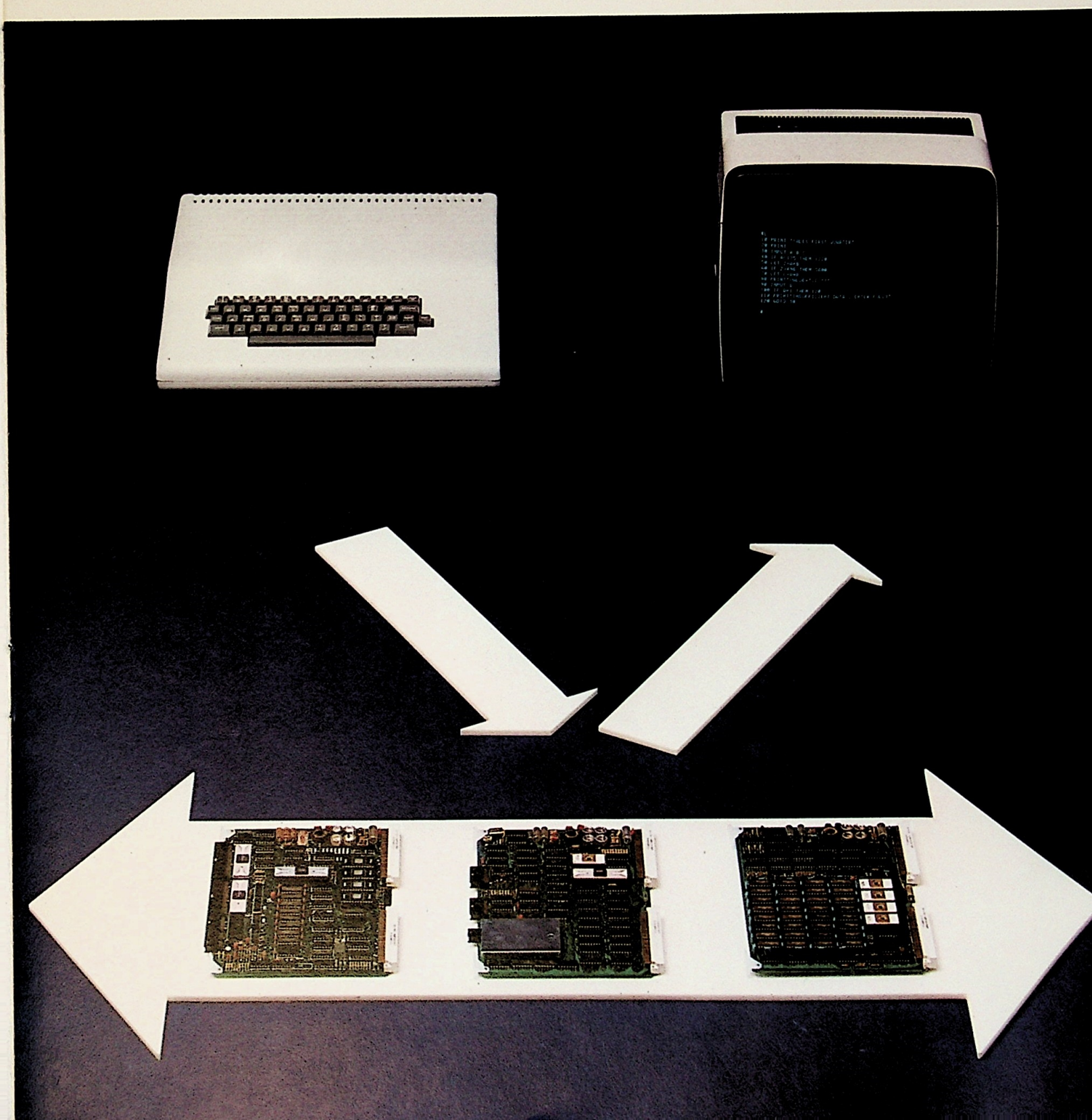
TBZ80
Bus termination board to improve further the excellent γamma-BUS noise margins.

PIZ80
The peripheral input/output board provides up to 8 bidirectional parallel I/O channels each with handshake protocol lines, two serial input/output and 4 independent counter timer circuits or real time clocks.
This board will support two external terminals using serial communications and 64 I/O lines or a mixture of single lines and parallel peripherals. Single + 5 V supply.

VDZ80
Video display board, with outputs for video monitor and commercial television receiver, with a standard alphanumeric keyboard.
The display is 64 or 40 characters (using a 5 x 7 dot matrix) on 16 lines. Communication is either serial RS232 or 20 mA loop up to 1200 baud or by memory mapped operation on the microcomputer γamma-BUS structure. Full cursor control is provided.

VTZ80
A stand alone video terminal using the VDZ80 board.
This terminal contains its own power supply and can be used with any computer.

TVZ80
A video monitor display for use with VDZ80 or VTZ80.



SSZ80
A system serial printer using a matrix impact head printing on 8½" wide paper with 32 to 96 columns at 120 characters per second. This printer is not dedicated to the CLZ80 microcomputer and can be used on any other computer giving a compatible interface.
Connects directly with a CLZ80 microcomputer parallel I/O port.

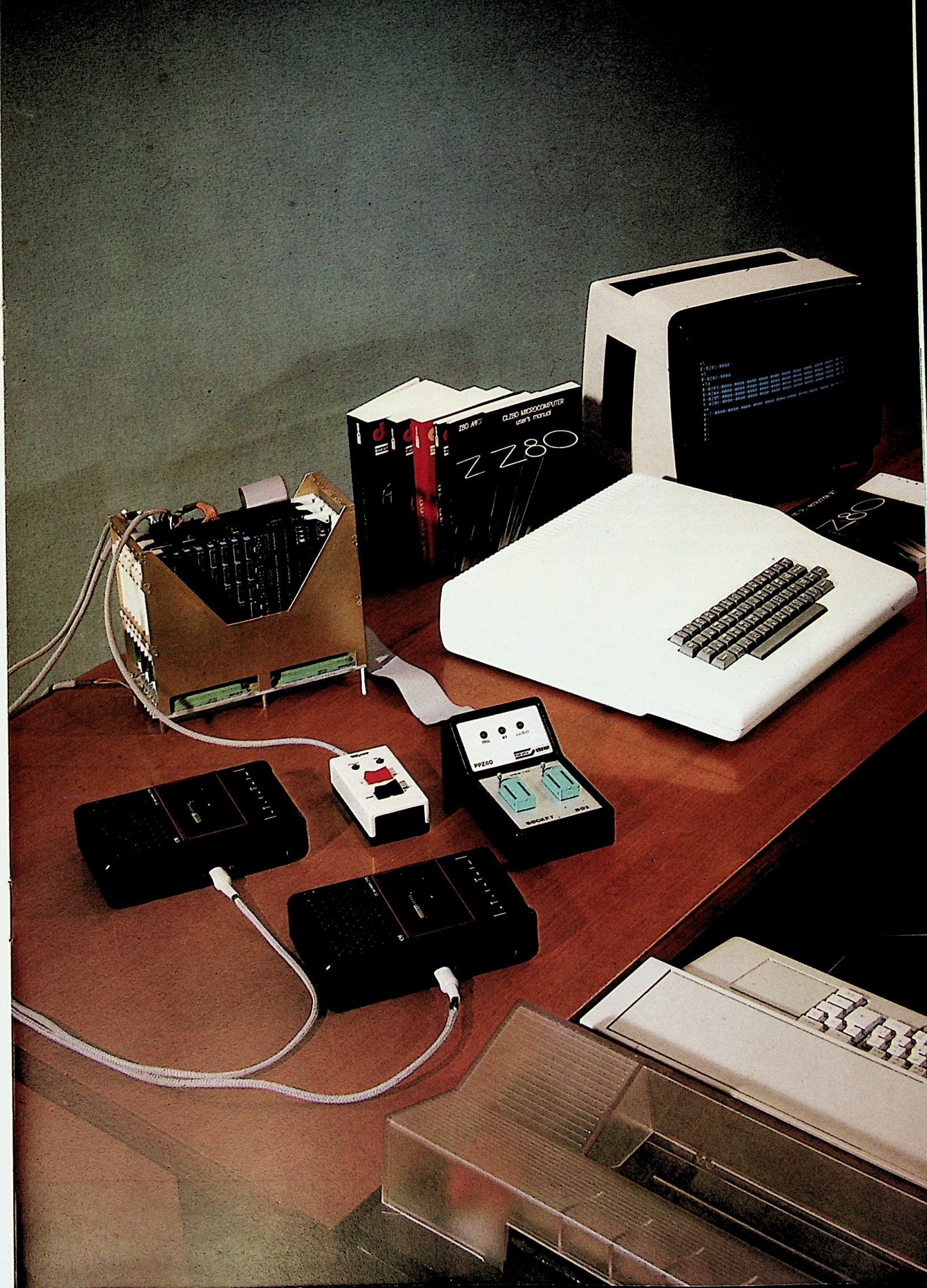
FLZ80
Floppy disk bulk storage system with an intelligent interface board for program or data files. Either SHUGART or PERSCI single or double density drives are supported. Up to 4 drives can be controlled.

PPZ80
The PROM programmer board is an intelligent programmer with personality options for M2704/8, M2716/32 and M2758 PROMs. This board is physically larger than the standard Eurocard format and projects out of the top of the card cage.
The top of the board carries a "zero force" socket for the PROM. Options allow the programming socket to be located remotely and 4 additional PROMs to be carried on the board.

MOUNTING HARDWARE, INTERCONNECTING CABLES AND ACCESSORIES

CTZ80
The microcomputer card cage and motherboard features the fully shielded γamma-BUS interconnect. This cage carries up to 8 circuit cards. Card cages can be interconnected for larger systems.

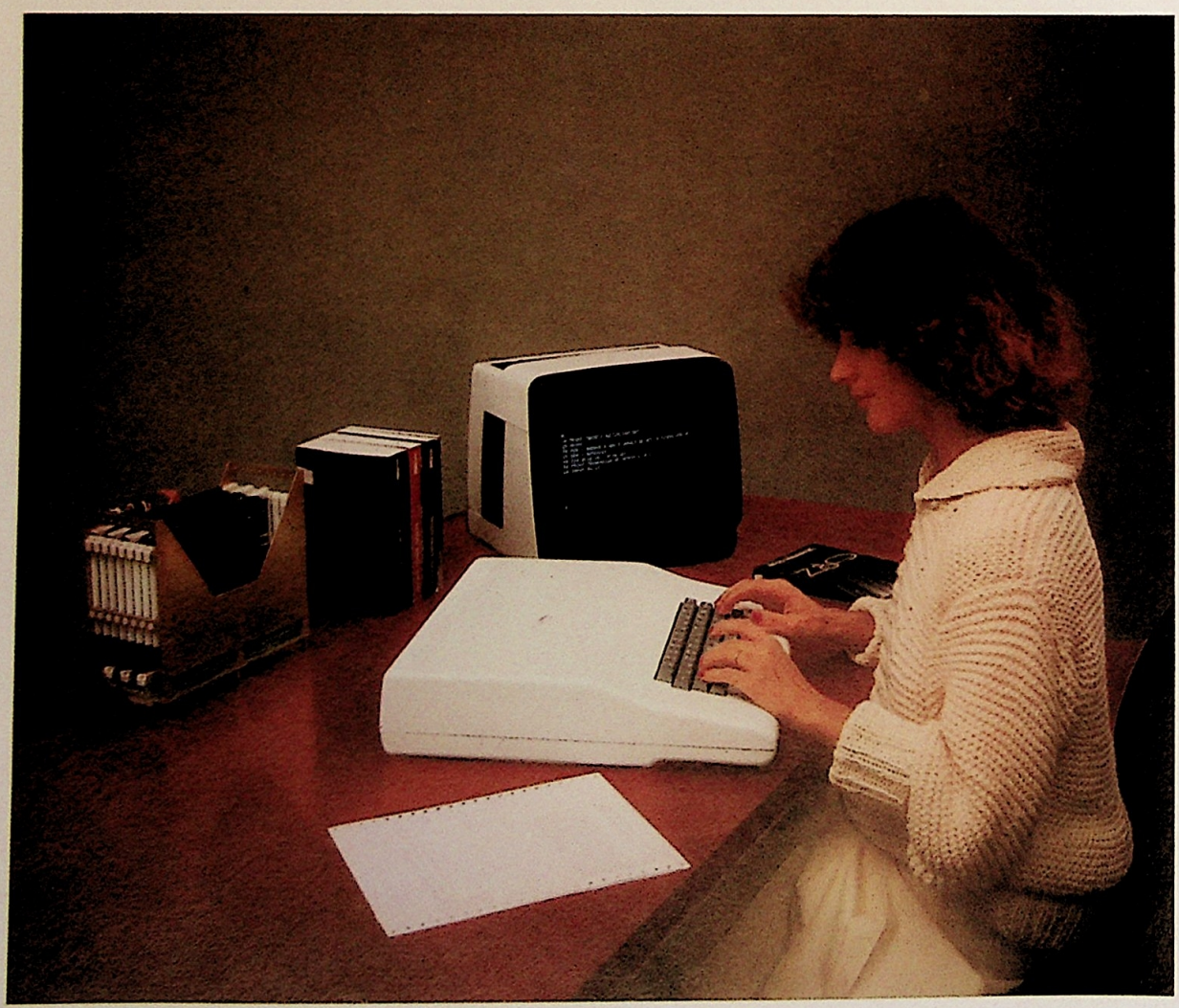
ALZ80
The power supply for the CLZ80 microcomputer provides 5V/15A capacity for a complete system. It is a high efficiency switch-mode supply with low heat dissipation.
In addition SGS/ATES microcomputer accessories covering plugs, sockets, user cards, wiring links and all the necessary cables for interconnection are provided for users.


CLZ80 MICROCOMPUTER
user's manual
Z80
PPZ80
SOCKET 901

FLEXIBILITY

Flexibility is the key to any microcomputer for OEM use. The CLZ80 Microcomputer System from SGS/ATES is the world's finest 8-bit processor and computer system for a wide range of applications. An increasing number of software specialists are originating programs in Z80 assembler language and more and more engineers are discovering the pleasures of its 158 instruction set.

□ γamma-BUS
The first European standard bus structure with completely screened signal paths and standard connectors.
□ CUSTOM ARCHITECTURE
Almost any custom architecture can be implemented: RAM choice, address reference, I/O facilities, bulk storage medium.
□ STAND ALONE VIDEO TERMINAL, MEMORY SYSTEMS, PRINTER
These can be used with other central processor and computer systems.



PERFORMANCE

The SGS-ATES Microcomputer System is the most productive 8-bit system in the world.

□ MOST EFFICIENT PROCESSOR

The Z80 is acknowledged to be the world leading N-channel MOS 8-bit CPU giving 5 to 10 times the processing speed and power over its nearest rival.

□ SOFTWARE PRODUCTS

The Monitor/Debug/Loader program MO-Z on PROM, the Operating System FR-Z with Monitor/Assembler/Editor/Debug on PROM and Editor and Assembler programs on Audio Cassettes are tailored for fast user program development.

□ HIGH LEVEL LANGUAGE

A specially designed, fast interpreter/compiler called Control Basic has been custom tailored to suit industrial process control and automation programming.

LOW COST

SGS-ATES invites you to examine in detail the costing of your OEM application using the CLZ80 Microcomputer System.

□ FREE SOFTWARE

Programs with no licence fee for using them, the only small charge is for the storage medium hardware.

□ EUROPEAN

The CLZ80 is designed and produced for the European market by SGS-ATES who more than any other company understands the needs of the local industrial user.

□ ADVANCED DESIGN

A high level of complexity per card gives greatly reduced unit costs for the microcomputer system.

□ MAINTENANCE

Return-of-post card replacement at a fixed cost plus an initial 3 months guarantee.

SGS-ATES SOFTWARE PRODUCTS

Employing development engineers with years of experience in microcomputer products SGS-ATES has defined extremely efficient software products for the microcomputer range. In a continuous program of development further software products will be announced in the near future. Our aim is to provide the serious OEM user with programming tools that will reduce the development and debug time of applications software. SGS-ATES policy is to provide the maximum software support both through the standard «FREE» programs and through pan European applications centers for assistance and training.

MONITOR AND DEBUG PROGRAM MO-Z

The MO-Z Monitor and Debug program is a 2K program in PROM. It features load and dump routines for audio, serial and parallel peripherals and an extensive user oriented debug program. The debug routines cover memory and register access, load and modify; normal or single step program run; trace of memory and registers and advanced breakpoint operations.

MONITOR, EDITOR, ASSEMBLER AND DEBUG FR-Z

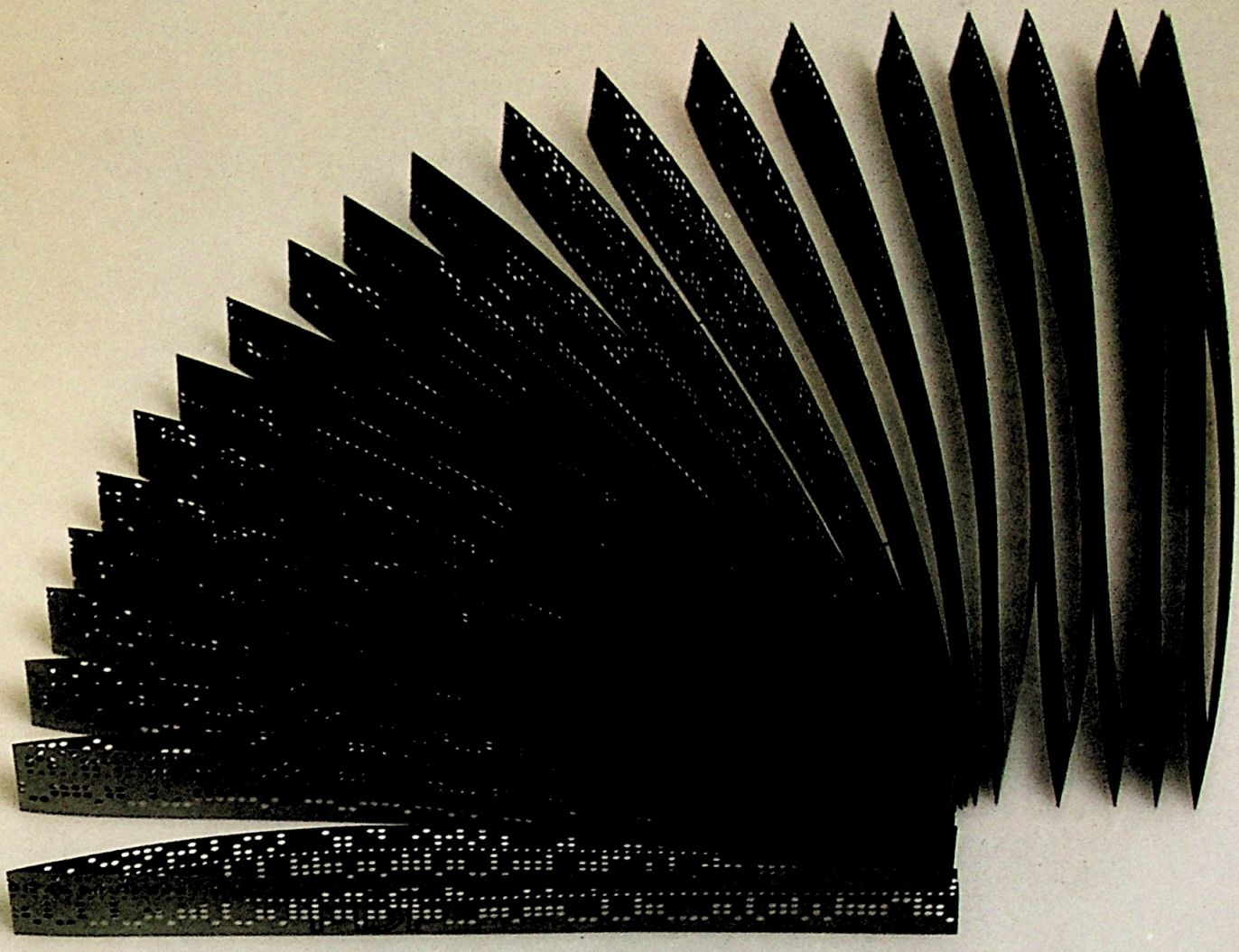
The FR-Z Operating System program is an 8K program in PROM.
It contains all the features of the MO-Z Monitor program plus an EDI-Z Editor and ASS-Z Assembler. The Editor is a character oriented editor with a buffer of 3000 characters. Full text handling (Insert, Change, Delete, Overlay) and strong search capabilities are provided. The Editor handles input/output files on tape or cassette bulk storage.
The Assembler uses 2 passes to generate machine code and a third for a listing with detailed error notation. Pseudo instructions allow program origin and end to be defined. Four powerful byte define instructions allow special character insertion and string insertion into the machine code.

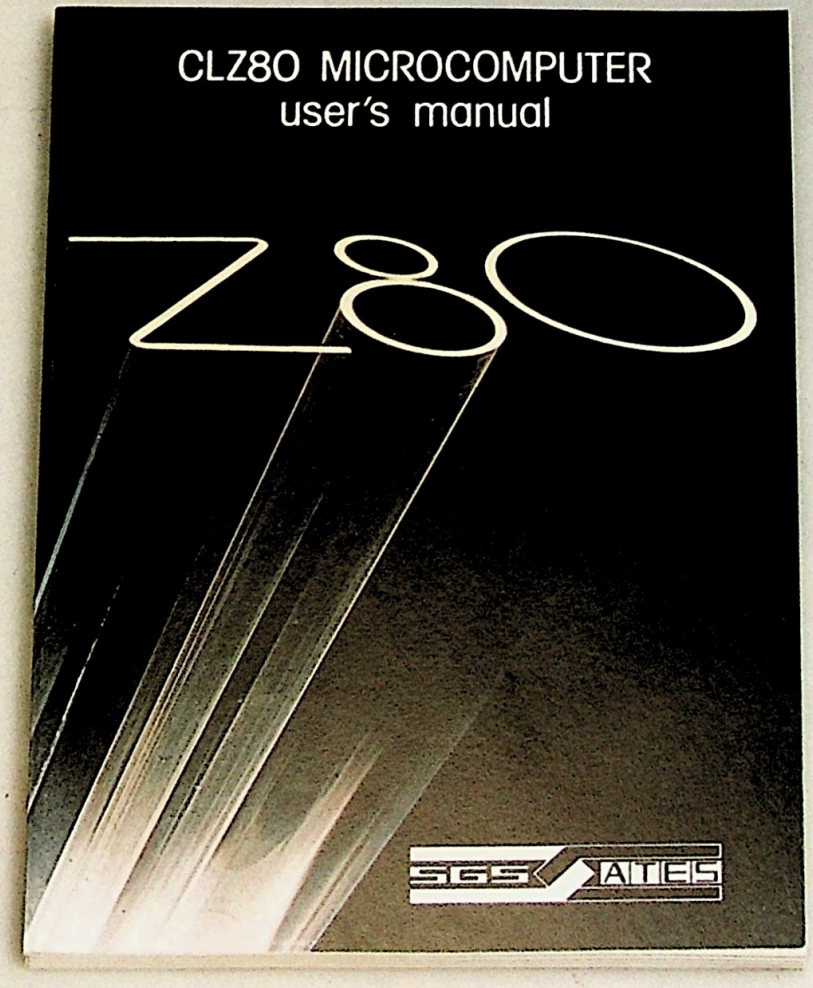
EDITOR EDI-Z AND ASSEMBLER ASS-Z PROGRAMS

The Editor EDI-Z and Assembler ASS-Z are supplied at very low cost, on audio cassettes for loading into CLZ80 system RAM. Both have autostart after loading with the MO-Z Monitor loader.

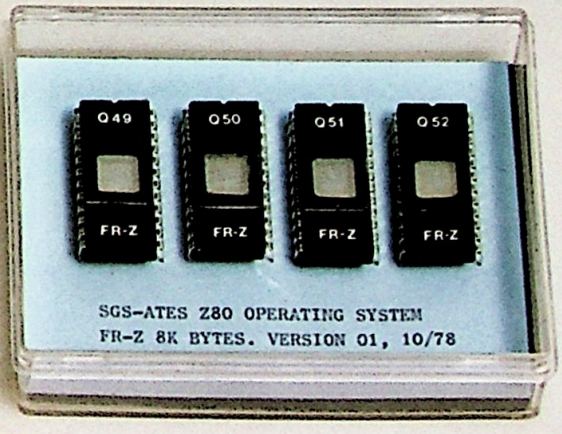
CROSS ASSEMBLER ASS-II PROGRAM

The Cross Assembler ASS-II is compatible with DEC PDP 11 machines. It is supplied on paper tape or written on user disk.

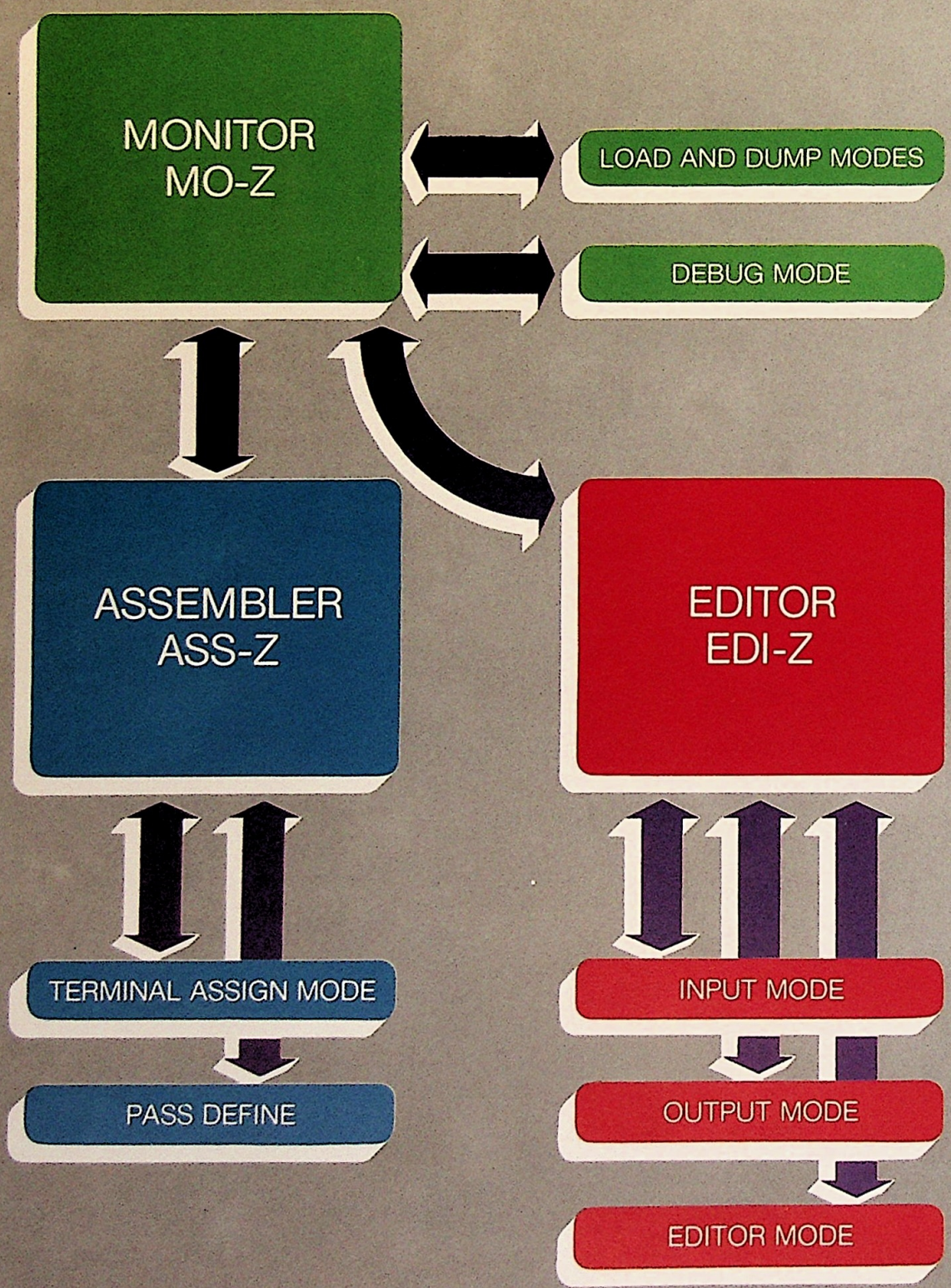



CLZ80 MICROCOMPUTER
user's manual
Z80
SGS ATES

SGS-ATES Z80 EDITOR EDI-Z 2K BYTES
(USE 16K RAM) AUTOSTART.VERSION 01,10/78


Q49
Q50
Q51
Q52
FR-Z
FR-Z
FR-Z
FR-Z
SGS-ATES Z80 OPERATING SYSTEM
FR-Z 8K BYTES. VERSION 01, 10/78

SOFTWARE STRUCTURE



SOFTWARE COMMANDS

MO-Z MONITOR/DEBUG

MONITOR MODE

*prompt

*L load from serial terminal reader

*H load from parallel reader

*C load from cassette

*D dump

OUT (L/C) output device assign
L = serial terminal
C = cassette

STR xxxx start and

END yyyy end address

ESC return to monitor

*A call Assembler if present

*E call Editor if present

DEBUG MODE

*O Open memory mode

O-xxxx/ examine and change memory contents

O-xxxxG run user program

O-xxxxB set Breakpoint

O-xxxxC continue to new Breakpoint.

*B Breakpoint repeat

*S Single step user program

*P Proceed past but reinsert a Breakpoint

*TN Trace user program of N=I to FH instructions with register print out

*R Register mode

*R-NN/ examine and change register NN contents

*R-T Register Trace and print out

*R-Z Registers set to Zero

ASSEMBLER ASS-Z

PASSES

1. Record of labels and check for valid statements
2. Output machine code
3. Listing for debugging and error identification

CTRL/C Return to monitor

X. Reassign input and output devices

Passes can be run 1, 2, 3 or 1, 3, 2

PSEUDO INSTRUCTIONS

□ ORG xxxxH originate assembly from address xxxxH

□ END indicates the end of a user source code program

□ LABEL: EQU yy equates a label to a value yy

□ LABEL: DEFB x define a value x to a specific labelled byte in a machine code listing

□ LABEL: DEFW xy define values x and y to two successive bytes in a machine code listing

□ LABEL: DEFS xx defines xx bytes spare (=ØØ) in the machine code listing

□ LABEL: DEFM/STRING/ defines STRING of ASCII characters in the machine code listing delimited by //

ASSEMBLER COMMANDS

*Monitor MO-Z prompt

*A call the Assembler

IN (L/H/C)	input device assign L = serial terminal reader H = parallel reader C = cassette
BIN (L/C)	binary output device assign L = serial terminal punch C = cassette
LIS (L/C)	listing output device assign L = serial terminal printer C = cassette
PASS?	1, 2, 3, CTRL/C or X - see pass definition

Listings recorded on Audio Cassette can be called and edited with the EDI-Z Editor program.

LISTING FORMAT

Each page is numbered Pag. xxx and shows the number of errors found on that page as ERR. xxx with an identification of the error type on the left hand side.

DUMP OUTPUT

The format of the output code is
:NNIIIIXXDD.....DDCC

:start of block

NN number of bytes in block

IIII starting address of block

XX two zeroes ØØ

DD bytes of program

CC binary addition to form checksum

Programs will auto start from address IIII if the last block is: ØØIIIIXXCC

The output is ASCII encoded hexadecimal representation of each 8-bit binary byte.

EDITOR EDI-Z

COMMAND MODE

*E	call the Editor
#	Editor prompt
IN (L, H, C)	input device assign L = serial terminal reader H = parallel reader C = cassette
OUT (L, C)	output device assign L = serial terminal punch C = cassette
# ESC	return to Editor command mode
# CTRL/C	return to Monitor MO-Z

INPUT TEXT

# R	Read from input until CRTL/L found
XXXX	Lines read in
# N	Next, outputs the buffer and reads in a new one from the input

EDITOR MODE

# A	Add new text to buffer
# K	Kill buffer
# D	Delete lines
# I	Insert lines
# O	Overlay line
# C	Change string
# S	Search for string.

CTRL/BELL continue the search for a repeat of a string

# B	Buffer locate, search all the input for a string.

CTRL/BELL continue the search for a repeat of a string.

Output and Edit commands may be preceded by m, n to operate on lines m to n only, or by just n to operate on line n only.

# LF	Keyed during text entry will print out the current line

OUTPUT TEXT

# L	Lists the buffer on the serial terminal.
# W	Writes the buffer on to the output device.
# Q	Quits the buffer output to the output device and adds CTRL/L at the end.
# E	Exit outputs the buffer and all the input to output device.
# T	Trailer, outputs 50 blank frames of paper tape.

Command T following output commands will convert TAB commands to the correct number of spaces on the output record file.

SPECIAL COMMANDS

Line Numbering

. = print line pointer value.

#/ = print number of lines in buffer.

These can be used before commands as an argument, for example

# . L	List the current line
#/L	List the last line in the buffer
# LF	Increments to the next line and prints
# <	Decrements to the previous line and prints
# CTRL/TAB	Tabs to the next fixed tab, these are at each 8 spaces
# CTRL/U	Erase the line entered before Return

MANAGEMENT

SUMMARY OF SYSTEM COMPONENTS

Type Number	Description
CLZ80-4	Microcomputer card and manual, 4 K RAM.
CLZ80-16	Microcomputer card and manual, 16 K RAM.
CLZ80-4/2	Microcomputer card and manual, 4 K RAM, 2 K MO-Z Monitor/Debug software in PROM.
CLZ80-16/2	Microcomputer card and manual, 16 K RAM, 2 K MO-Z Monitor/Debug software in PROM.
CLZ80-4/8	Microcomputer card and manual, 4 K RAM, 8 K FR-Z operating system software in PROM.
CLZ80-16/8	Microcomputer card and manual, 16 K RAM, 8 K FR-Z operating system software in PROM. All versions supplied with a programming and hardware manual.
RAZ80-16	Memory card, 16 K RAM and sockets for 4 PROMs and manual.
RAZ80-32	Memory card, 32 K RAM and sockets for 4 PROMs and manual.
RAZ80-48	Memory card, 48 K RAM and sockets for 4 PROMs and manual.
RAZ80-64	Memory card, 64 K RAM and sockets for 4 PROMs and manual.
PIZ80	Peripheral Input-Output board with 8 parallel I/O channels, dual serial I/O channels and 4 counter-timer real time clocks and manual.
VTZ80	Visual display terminal contained in a keyboard unit, RF output for CCIR 625 line TV display or video monitor, 16 lines of 64 or 40 characters on 5x7 dot matrix. Serial 110-1200 baud, 20 mA or RS 232 communications with the computer. 1 K character page display memory. Built-in power supply. Full cursor control and local editing functions and manual. Including connection cables.
VDZ80	Visual display card to plug into microcomputer card cage (with keyboard). Two modes of operation: memory mapped on the system γamma-BUS structure or serial 110-1200 baud interface. Powered from the card cage. Other features as the VTZ-80.
TVZ80	Video monitor.

Type Number	Description
SSZ80	Serial matrix impact printer, 8 1/2" paper, 36 to 96 columns, 120 characters/sec. and manual.
FLZ80	Floppy disk interface controlling up to 4 drives, SHUGART or PERSCI single or double density. Overlap seek capability. File maintenance operating system and manual.
PPZ80-S	PROM programmer card for PROMs M 2704/8, 2758, 2716/32. On board display of programming conditions. Zero force insertion socket. Software utility program and manual.
PPZ80-B	As PPZ80-S except remote PROM socket.
PPZ80-ES	As PPZ80-S but with 4 additional sockets for PROM memory expansion.
PPZ80-EB	As PPZ80-B but with 4 additional sockets for PROM memory expansion.
CTZ80	Card cage and 8 slot mothercard.
ALZ80	Power supply 5 V/15 A.
SPZ80	Extension card.
TBZ80	Bus termination card.
WWZ80	User wire wrap card.
A1Z80	Turret tags (100) for user system structuring.
C1Z80	Connector pack (5) for I/O ports.
C2Z80	Connector pack (2) for γamma-BUS, wire wrap.
C3Z80	Connector pack (2) for γamma-BUS, PCB.
C4Z80	Connector pack (2) for γamma-BUS, solder tag.
W1Z80	Cable and minicontrol panel, START, BREAK push buttons and HALT indicator lamp.
W2Z80	Cable for GRUNDIG cassette recorder.
W3Z80	Cables for γamma-BUS expansion by interconnecting two card cage mothercards.
W4Z80	Cable for REMCO cassette recorder.
W5Z80	Cable for serial VDZ80 connection.
W6Z80	Cable for TVZ80 connection.
W7Z80	Cable for Silent 733 serial connection.

SGS-ATES GROUP OF COMPANIES

INTERNATIONAL HEADQUARTERS
SGS-ATES Componenti Elettronici SpA
Via C. Olivetti 2 - 20041 Agrate Brianza - Italy
Tel.: 039-650341–4/650441–5/650841–5
Telex: 330141-330131

BENELUX
SGS-ATES Componenti Elettronici SpA
Benelux Sales Office
-B-1180 Bruxelles
Winston Churchill Avenue, 122
Tel.: 02-3432439
Telex: 24149 B

DENMARK
SGS-ATES Scandinavia AB
Sales Office:
2730 Herlev
Marielundvej 46D
Tel.: 02-948533
Telex: 35280

FRANCE
SGS-ATES France S.A.
75643 Paris Cedex 13
Résidence "Le Palatino"
17, Avenue de Choisy
Tel.: 5842730
Telex: 021-250938

GERMANY
SGS-ATES Deutschland Halbleiter
Bauelemente GmbH
8018 Grafing bei München
Haidling 17
Tel.: 08092-691
Telex: 032-527370
Sales Offices:
1000 BERLIN 20
Gatower Strasse 185
Tel.: 030-3622031
Telex: 01 85418
3000 Hannover 1
Lange Laube 19
Tel.: 0511-17522/3
Telex: 09 23195
8000 München 40
Gernotstrasse 10
Tel.: 089-304270/304485
Telex: 05 215784
8500 Nürnberg 15
Parsifalstrasse 10
Tel.: 0911 - 49645
7000 Stuttgart 80
Kalifenweg 45
Tel.: 0711-713091/2
Telex: 07 255545

HONG KONG
1329 Ocean Centre
Canton Road, Kowloon
Tel.: 3-662625
Telex: 63906 ESGIE HX

ITALY
SGS-ATES Componenti Elettronici SpA
Sales Offices:
50127 Firenze
Via Giovanni Del Pian Dei Carpini 96/1
Tel.: 055-4377763
20149 Milano
Via Correggio 1/3
Tel.: 02-4695651
00199 Roma
Piazza Gondar 11
Tel.: 06-8392848/8312777
10134 Torino
Via La Loggia 51/7
Tel.: 011-634572

NORWAY
SGS-ATES Scandinavia AB
Sales Office:
Oslo 9
Haavard Martinsens Vei 19
Tel.: 106050
Telex: 11796

SINGAPORE
SGS-ATES Singapore (Pte) Ltd.
Singapore 12
Lorong 4 & 6 - Toa Payoh
Tel.: 531411
Telex: ESGIES RS 21412

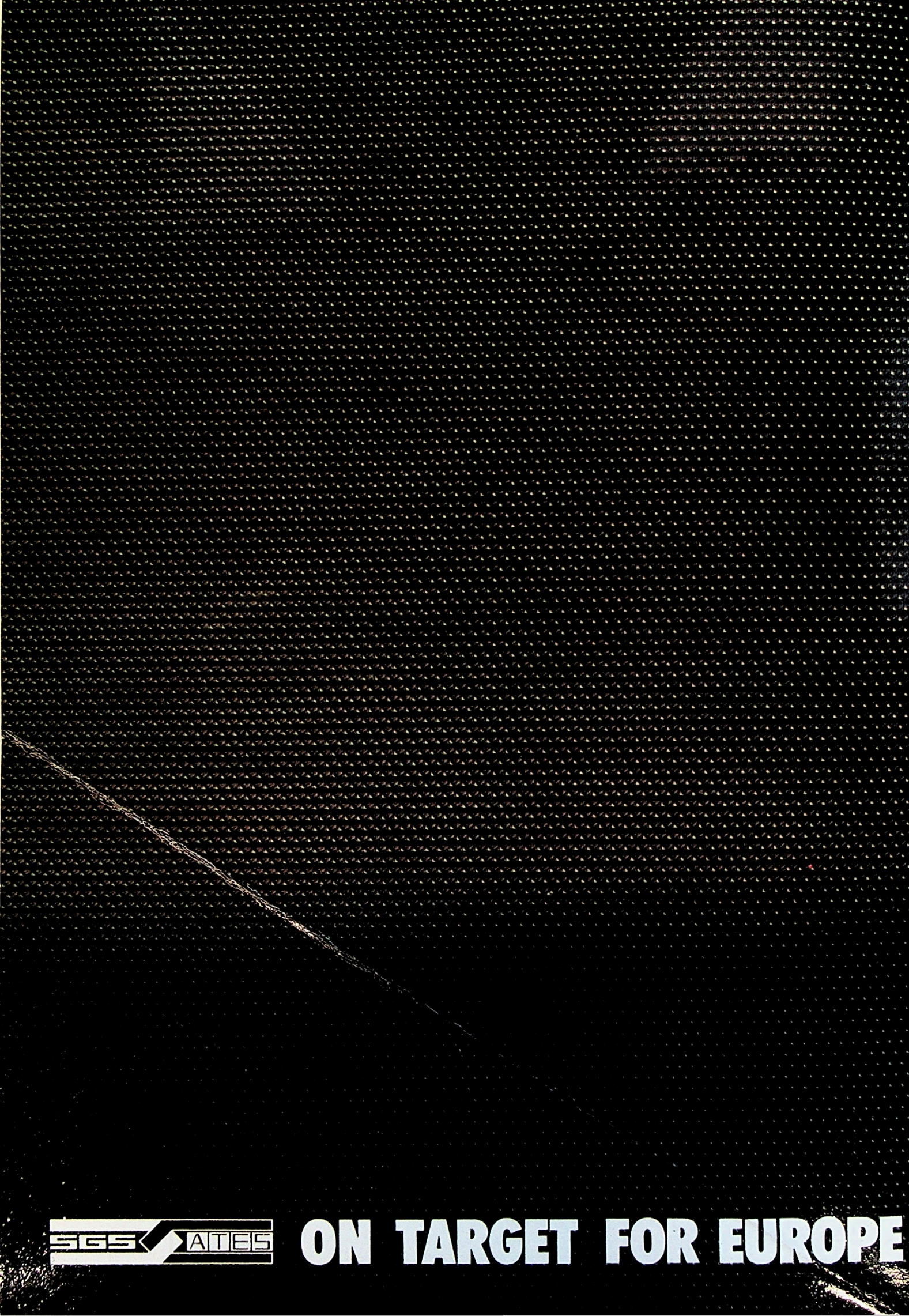
SWEDEN
SGS-ATES Scandinavia AB
19501 Märsta
Tingvallavaegen 9J
Tel.: 0760-40120
Telex: 042-10932

UNITED KINGDOM
SGS-ATES (United Kingdom) Ltd.
Aylesbury, Bucks
Planar House, Walton Street
Tel.: 0296-5977
Telex: 041-83245

U.S.A.
SGS-ATES Semiconductor Corporation
Waltham, MA 02154
79 Massasoit Street
Tel.: (617) 891-3710
Telex: 923495 WHA

© SGS-ATES Componenti Elettronici SpA, 1978 - Printed in Italy
TM: Z80 is registered trademark of Zilog, Inc.
Because of its policy of constant development, SGS-ATES reserves the right to alter any of the products described herein without prior notice.

Garzanti s.p.a. - Cernusco s./N.


SGS ATES
ON TARGET FOR EUROPE